

## Case report

# Salmonella in a chicken hatchery

F B Smyth, J D Watson

Accepted 20 June 1987.

---

Due to concern about increasing mortality among 7-day-old chicks in a chicken hatchery the management arranged to screen all hatchery staff for salmonella excretion. The hatchery is part of a complex involving all stages of chicken meat production but is physically separate from the broiler units and chicken processing plant. The hatchery also has its own staff, there being no exchange of staff between it and other parts of the complex. The hatchery receives eggs from a variety of local farms and the day-old chicks are subsequently distributed throughout Northern Ireland. Approximately 200,000 chicks per week are hatched in the unit.

Regular bacteriological analysis is performed on eggshell, fluff, blood and faeces found in the hatchery. This has, in the past, revealed periodic salmonella infection; usually *S typhimurium* and *S enteritidis*. Routine bacteriological monitoring of chicken feed had proved negative. The management have regarded a mortality rate of 1% among 7-day-old chicks as acceptable. Recently the mortality rate rose to 5 – 10%. To exclude the possibility that staff could be introducing salmonella into the hatchery, management decided to screen the staff for salmonella excretion.

## CASE STUDY

Twenty-three staff were employed in the hatchery. None had recently been on sick leave. Twenty-one submitted specimens and 11 were found to have salmonella in their faeces. *S enteritidis* (phage type 4) was isolated from nine, one was excreting *S infantis* and one *S typhimurium* RDNC.

The specimens were cultured in a hospital laboratory and by long-standing arrangement the cases of salmonella excretion were notified by the laboratory to the community medicine department for further investigation. The hatchery staff were then interviewed by health visitors to ascertain the presence of any abdominal symptoms and to obtain details of household contacts. All staff were interviewed to emphasise the importance of personal hygiene. Until investigations were complete, household contacts who were employed as foodhandlers and children under seven were excluded from work/school. Stool samples were only obtained from contacts if they had abdominal symptoms or were in the above groups.

---

Department of Community Medicine, Northern Health and Social Services Board, County Hall, Ballymena, Co. Antrim, Northern Ireland, BT42 1QB.

F B Smyth, MB, MSc, MRCP, Senior Registrar.

J D Watson, BA, MB, DipSocMed, FFCM, Chief Administrative Medical Officer.

All contacts were asymptomatic and their stool samples were negative for salmonella. Only one member of staff, excreting *S enteritidis*, had abdominal symptoms. He had had intermittent upper abdominal pain, vomiting and semi-formed motions for one year. His wife and two children had had several episodes of diarrhoea and vomiting during the past six months. However, his family were asymptomatic and culture negative at the time of examination.

Several months earlier the six-week-old baby girl of a local farmer had contracted *S typhimurium* RDNC. No other family members were affected. Her father had recently received 10,000 day old chicks from this hatchery. Approximately 200 of these chicks died in the first week and subsequent postmortem examination on five chicks revealed chronic yolk sac infection with *S typhimurium* RDNC.

#### COMMENT

Consumption of poultry products has increased dramatically over the last 10 – 15 years and this has led to the development of a highly intensive industry. Many episodes of food poisoning are due to salmonella infection and poultry is frequently the food vehicle. Modern processing plants can have a throughput of 10,000 birds per hour and hatcheries can contain thousands of birds. Thus there is a considerable risk of cross-infection occurring and once salmonella infestation occurs in a plant it is difficult to eradicate.

It is impossible to state the exact incidence of salmonella infections in chickens as often the birds are asymptomatic.<sup>1</sup> In Canada 15 – 39% of retail chicken carcasses have been found to be contaminated with salmonella.<sup>2</sup> However, the current prevalence of salmonella in chicken carcasses in Northern Ireland is not known. Eggs from infected flocks can be contaminated during laying, or from infected litter, dust and equipment on the production site, as motile salmonella can penetrate the shell. Contaminated poultry feed is another source of infection. Spread to healthy chickens is particularly likely to occur during hatching when chicks are breaking through the shell. Stress such as handling, transportation and overcrowding tend to increase shedding of salmonella from infected chickens.<sup>3, 4</sup>

Very little has been described in the literature concerning hazards to staff working in poultry plants, yet they frequently seem to work with poultry in which salmonella infestation is endemic. The organism can be cultured from fluff, floor litter, water and poultry house dust. It has been suggested that when fluff and meconium collected at the hatchery are contaminated with salmonella, it is likely that day-old chicks are infected. When such birds are processed the carcasses may well be contaminated.<sup>3</sup>

In this hatchery 48% of staff had a positive stool culture for salmonella when first screened. Repeat specimens from this group also revealed salmonella in most instances. This pattern was more suggestive of intermittent excretion of salmonella, rather than intermittent detection. It is likely that staff acquired the infection from their work as both *S enteritidis* and *S typhimurium* had been periodically observed in the unit over the past year. Also, staff excreting *S enteritidis* had a common phage type suggesting a common source. *S infantis* had been recently noted in other parts of the complex.

There was a surprising number of staff asymptomatic despite working in an infected environment and excreting salmonella. There was no evidence to suggest spread of salmonella to close household contacts and this probably relates to good personal hygiene. None of the household contacts of hatchery

staff included a young baby. The six-week-old baby described earlier was bottle-fed and was thus probably at higher risk of gastrointestinal infection. Her father, who handled the chicks, admitted that he let the baby suck his fingers and this was probably how the baby acquired the infection.

Unfortunately because of the fluctuating mortality among the chickens it is impossible to conclude whether the health visitors' efforts in reminding the employees of the importance of personal hygiene were responsible for any reduction in mortality rates. Nearly half of the hatchery staff were excreting salmonella and it is conceivable that most staff would be salmonella excretors. This study highlights the importance of maintaining good personal hygiene while working in a salmonella contaminated environment. Salmonella are easily removed from hands by simple handwashing with soap and water.<sup>5</sup>

## REFERENCES

1. Hansen HC. Epidemiology and control of salmonella infections in connection with production of day-old chickens. In: Larsen HE, ed. Priority aspects of salmonellosis research: a workshop in the CEC Programme 1983. Luxembourg, Commission of the European Communities 1984: 217-26. (EUR 9179).
2. Pivnick H, Handzel S, Lior H. Product contamination with salmonella. In: Barnum DA, ed. Proceedings of the International Symposium on Salmonella and Prospects for Control. Guelph (Ont): Univ Guelph, 1977: 139-55.
3. Bhatia TRS, McNabb GD. Dissemination of salmonella in broiler-chicken operations. *Avian Dis* 1980; **24**: 616-24.
4. Sokolowski SA, Campbell SG. Salmonellosis and stress. *Pract Vet* 1977; **49**: 4-6.
5. Pether JVS, Scott RJD. Salmonella carriers; are they dangerous? A study to identify finger contamination with salmonella by convalescent carriers. *J Infect* 1982; **5**: 81-8.

## BOOK REVIEWS

**AIDS: questions and answers.** 2nd ed. By V G Daniels. (pp 116. £5.95). Cambridge: Cambridge Medical Books, 1987.

This book is written in an easy to read and informative style, and is intended for non-medical readers. It covers all the social questions that are inevitably asked, and answers them clearly. The sections on the more specifically medical aspects would probably not mean much to the lay reader, and even the appendix on medical terms would not be comprehensible to most of the public. For the medical reader this section provides a useful guide to further reading which may be required.

The author has provided some very helpful information in the appendices with regard to additional reading, and the section on useful addresses would be very helpful for those worried about this condition. Overall, this is as good a book as I have seen aimed at this level of readership.

RDM

**AIDS: the acquired immune deficiency syndrome.** 2nd ed. By V G Daniels. (pp 188. £11.95). Lancaster: MTP, 1987.

This is a very light-weight book which appears to be cashing in on the increased awareness and interest in the acquired immune deficiency syndrome. It is aimed at the 'informed layman' rather than the medical profession. The low-key information does not add substantially to knowledge of the subject.

DIHS